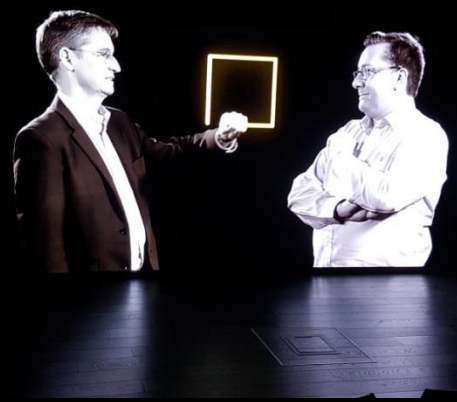
Home'in

The sensitive home

Ambient connectivity, connected objects and artificial intelligence will revolutionize the way we live our daily lives at home.



Design the smart and sensitive home that protects our private lives and allows openness to the other: an experimental house, an open and interoperable environment, a common architecture

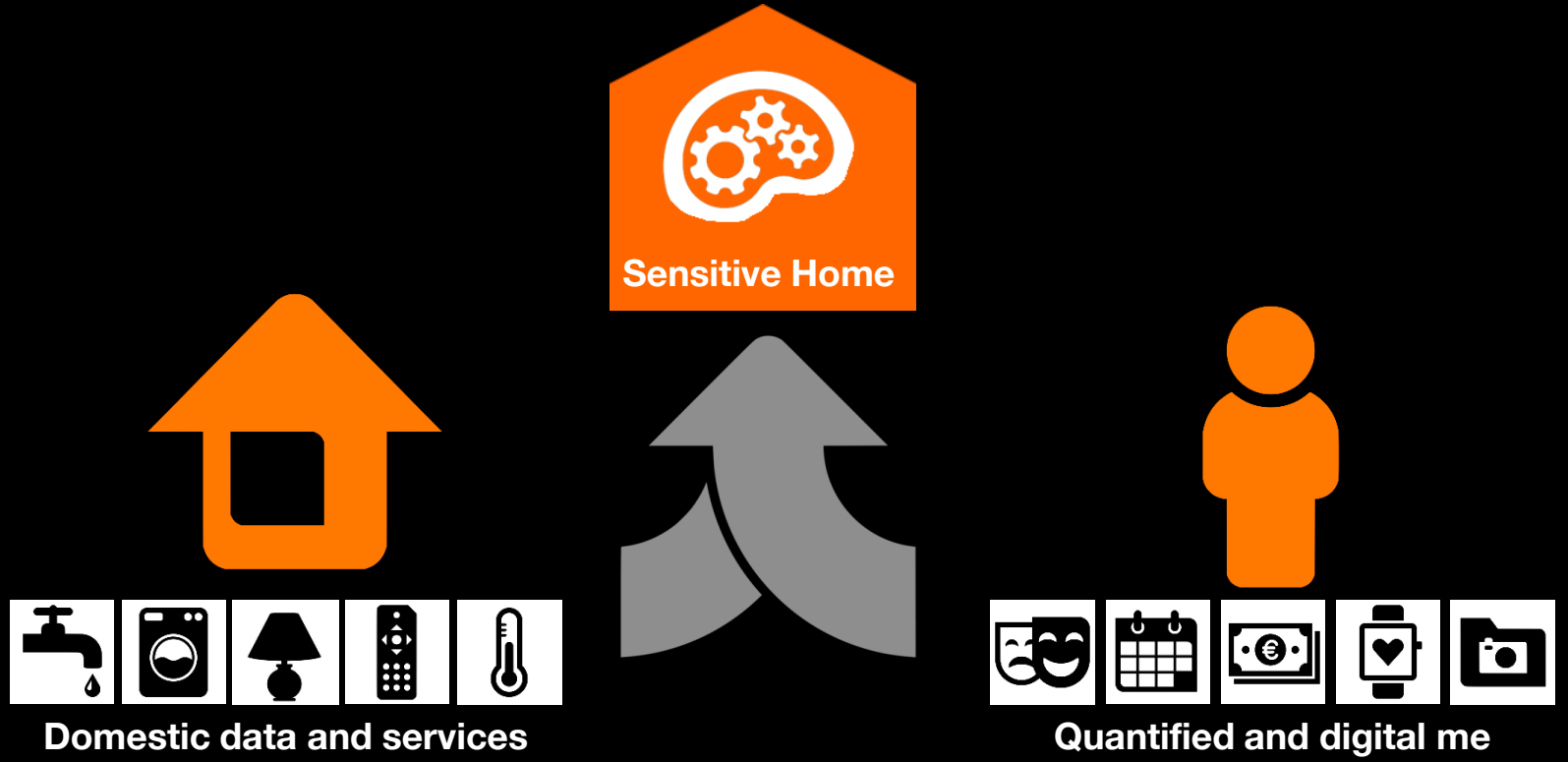
Home’in
goals and vision

Presentation Home'in

From Connected to Sensitive Home

Paving the way to the future of sensitive and intelligent living spaces

What if ?


Sensitive Home
Domestic data and services
Quantified and digital me

Home’in goals and ambition

Home is the sanctuary for intimacy and privacy

- Local embedded processing

A “home presence” tailored to the family

- Providing immersive, ubiquitous, pro-active, intelligent and emotional interactions

Integrative platform

- Allow manufacturers, developers, sociologists, designers to contribute
- Federate Orange contribution research&innovation activities
  - Promote data sharing between projects
  - No platform if no contributions
  - Offer an infrastructure to ease functional and technical integration

Prior to technical work, define the vision

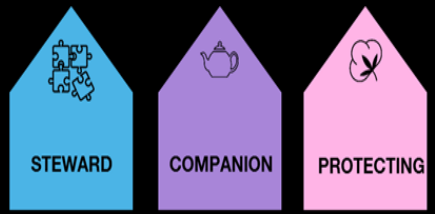
Habitats (houses + location)

Inhabitants

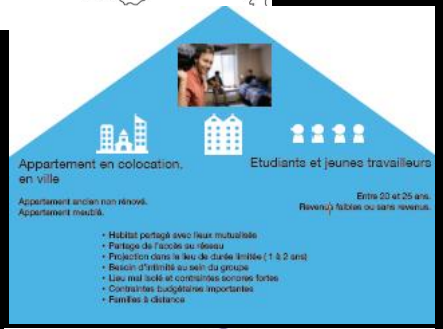
« Ways of living » and needs

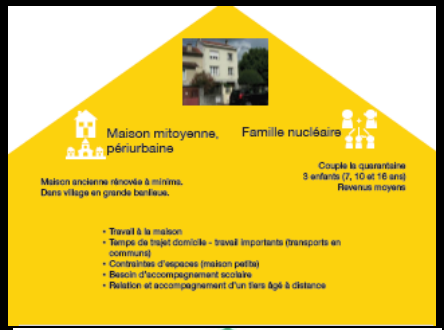
The concept of « Maisonas »

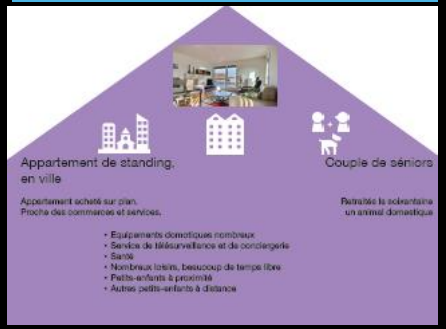
6 key home profiles The Maisonas

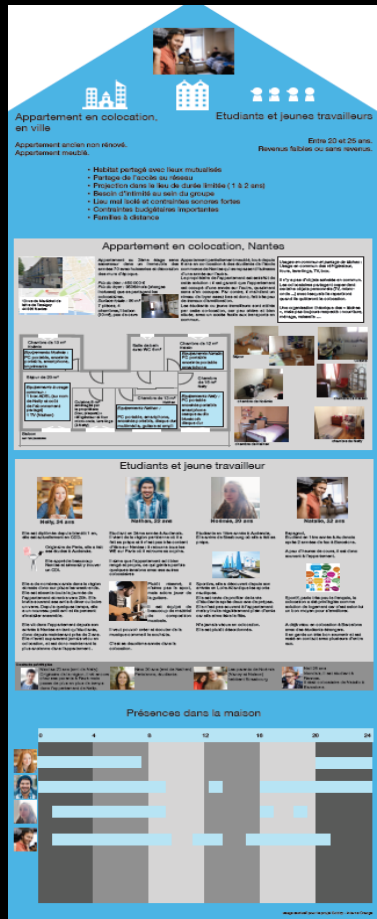


From sociological studies









6 different Maisonas, each of them with a descriptive booklet
and typical user stories, **to which all Home'in demo scenarios relate:** /

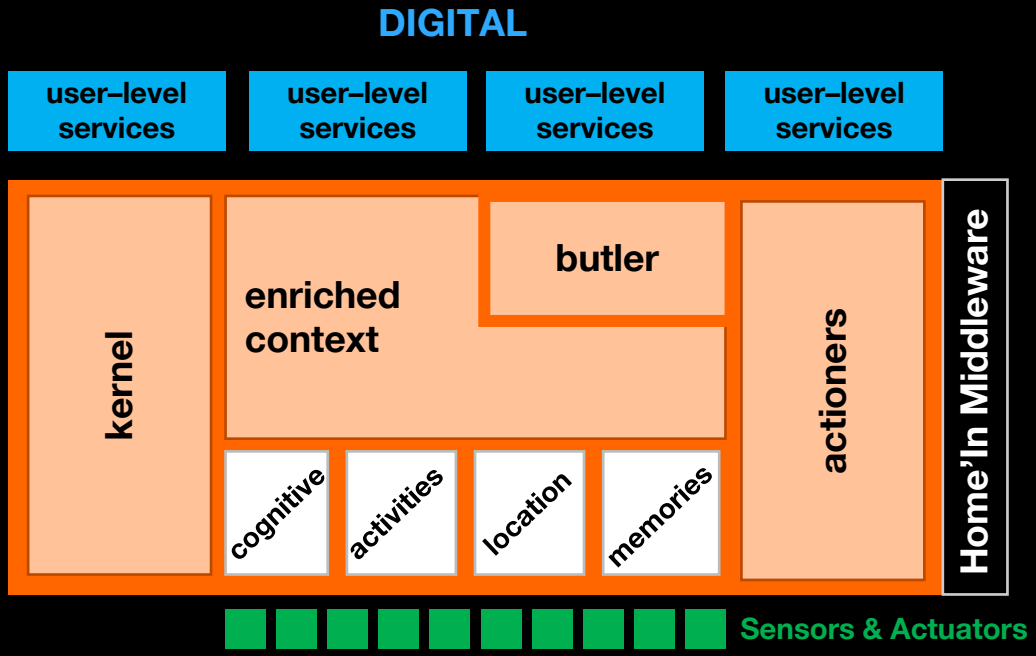
https://hellofuture.orange.com/fr/la-maisona-un-outil-de-conception-pour-une-maison-du-futur-human-inside/

Home’in

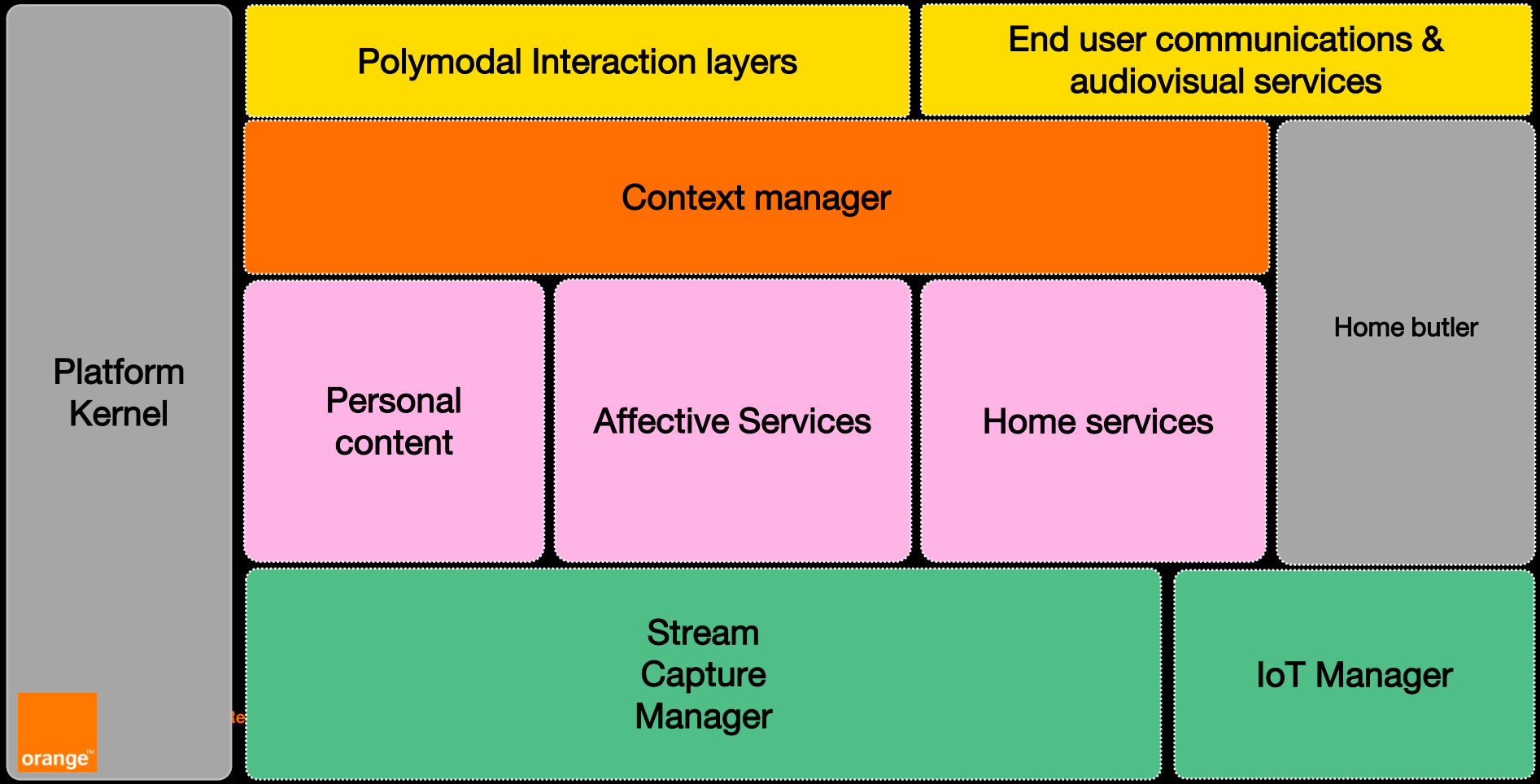
a collective research work

Our playground : the Home'In research platform

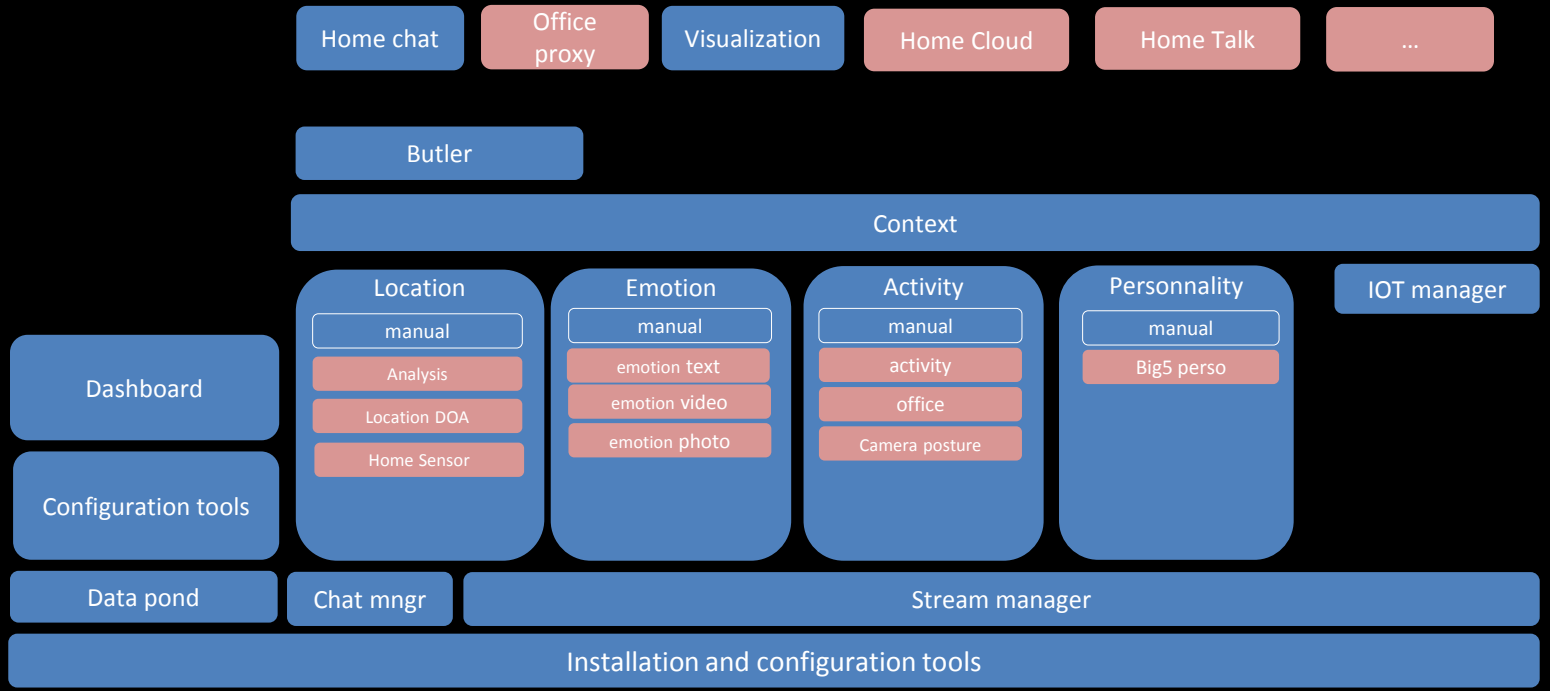
To build a comprehensive sensitive experience, Home'In middleware provides a service-oriented context model that gathers and enriches various data describing human activities and feelings in a limited space. As a research project, it's a testbed for validating innovative use cases or technologies.



Functional architecture: a match to our goals



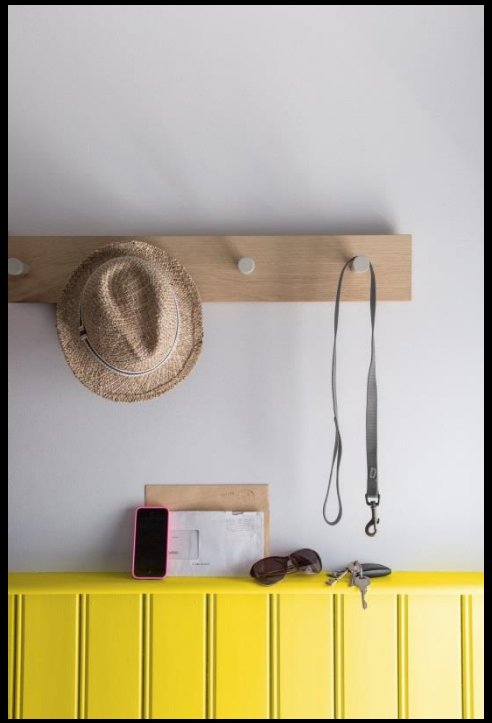
A Core product integrating research projects technologies



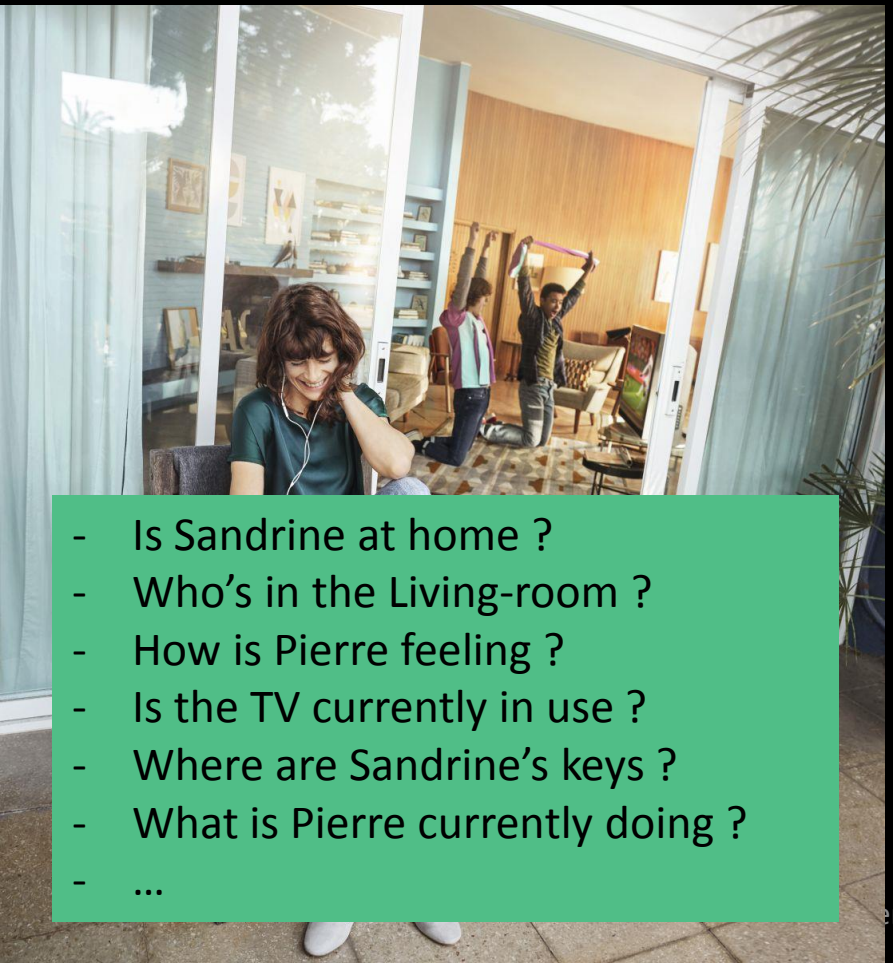
Home'in Core product

Reseach projects technos

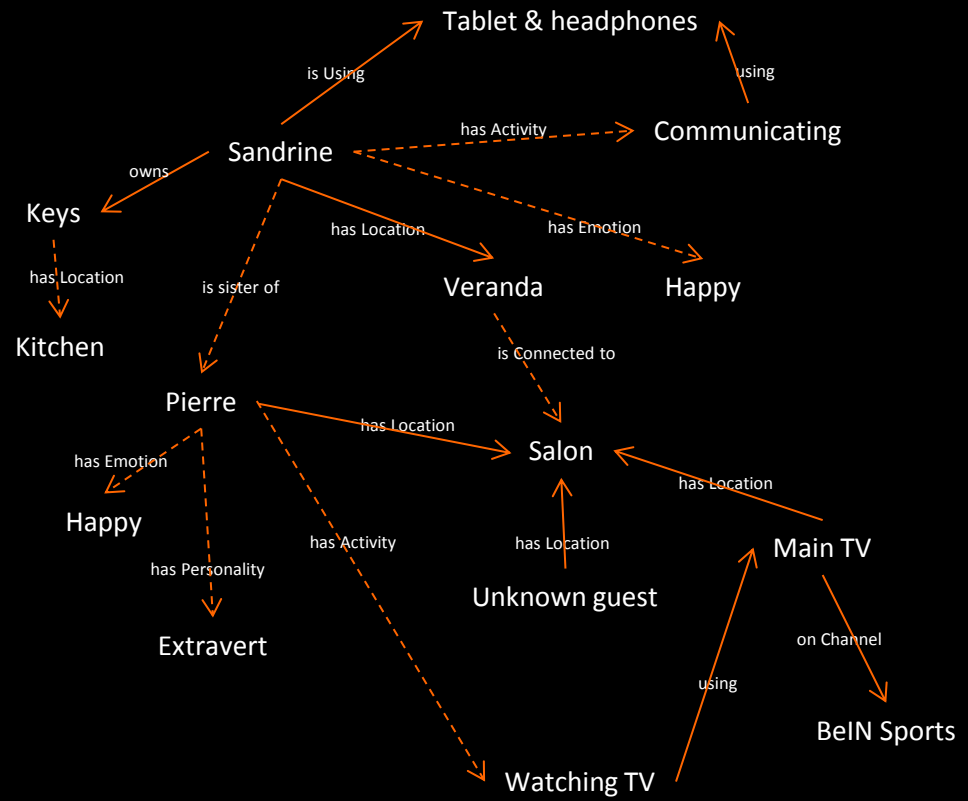
Home’in : the context as a fundation for decision making



A snapshot of Sandrine's life as seen by Home'in



- Is Sandrine at home ?
- Who's in the Living-room ?
- How is Pierre feeling ?
- Is the TV currently in use ?
- Where are Sandrine's keys ?
- What is Pierre currently doing ?
- …



Affective services, dealing with emotions and personality in Home'in

Affective Services: emotions, personality

Home'in

Emotion and personality of household members…

How to capture ?

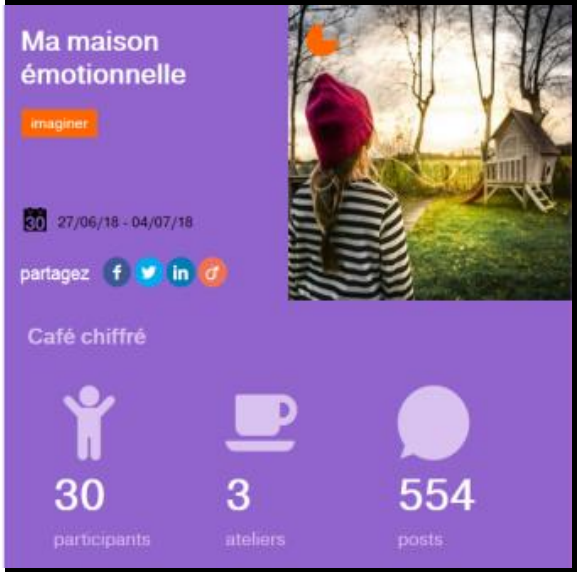
Capture what ?

What kind of analysis?

…but also from the home

What for?

Ekman model

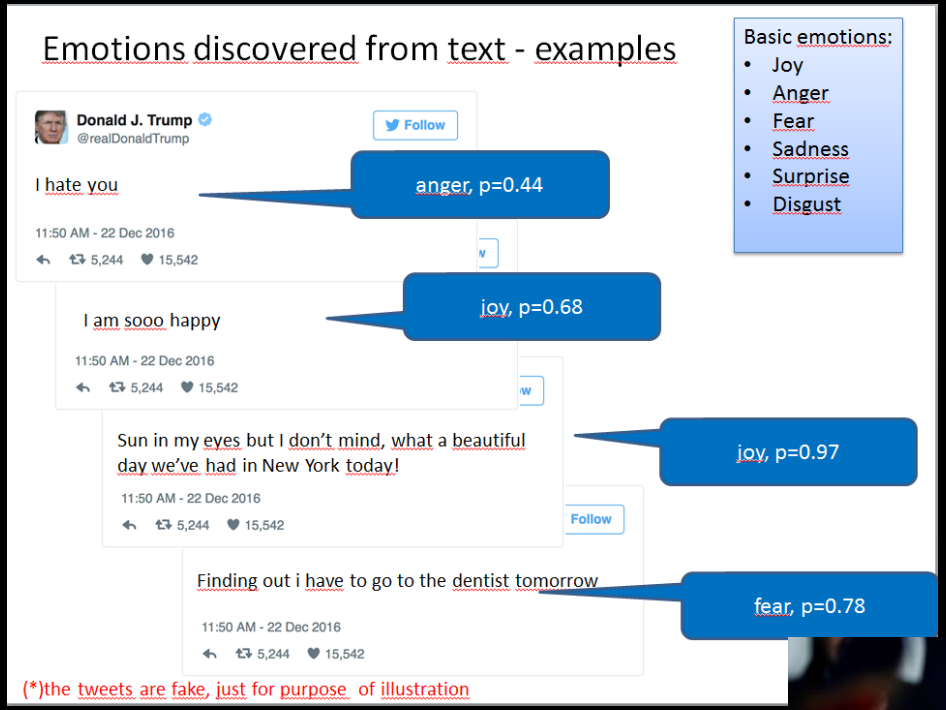


CAPTURE

ANALYZE

OPERATE

Emotions



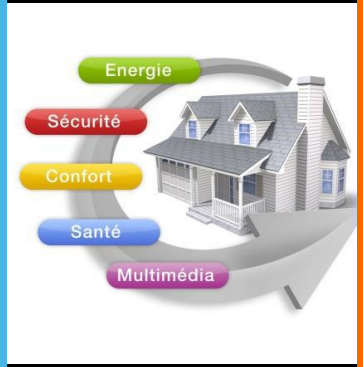
- Emotion in short text
- Emotion on the face
- Ready to add
  - Technos from partnerships
  - News capture
    - Sound (voice, noises,…)

{label: "Angry", score: 31.082397460938}
{label: "Sad", score: 9.4846878051758}
{label: "Surprise", score: 4.3111901283264}
{label: "Happy", score: 1.0627892017365}
{label: "Fear", score: -1.8378028869629}
{label: "Disgust", score: -14.572533607483}
{label: "Neutral", score: -19.205419540405}

Input from real customers

Organization of 3 workshops

- **Workshop 1**: Capturing emotions
  - Obj : Measure awareness to the use of emotions in services
- **Workshop 2**: Emotions in the house
  - Obj : Evaluate acceptability ? For which purposes, services ? In which way?
- **Workshop 3**: My house communicates about its emotions?
  - Obj : Evaluate acceptability ? For which purposes, services ? In which way?



RESULTS

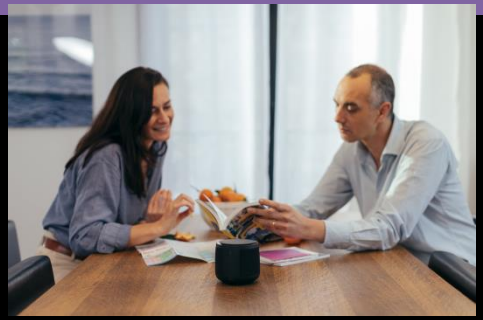
- No opposition to the capture
  - « In the home and no marketing use »
  - « Without sensor on me »
  - « With a validation for interpretation & rulings »
- Give Role and Profiles to your home
  - Caregiver, Protector, Festive, Relaxing, Player, Mediator, Companion, Maternal for the role
  - Energy, Security, Comfort, Health, Multimedia for the profile
  - Communicate on its fonctionnal state emotionally

Home services, detecting who, where, what

Identification, location, activity

Identification of a person

- Diane is in front of the mirror
- Pascal is speaking



Detection of a location

- Is somebody in the lounge room?
- Where is Pauline?
- Who is in the bedroom?

Detection of activity

- Somebody is having a shower in the bathroom
- Pierre is likely to have dinner soon

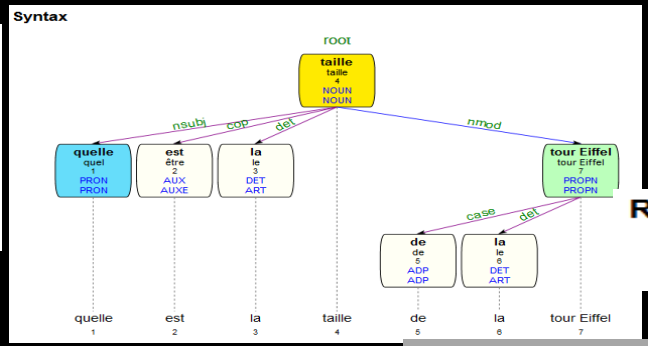
Natural Language Processing

Natural Language Understanding, NLU

- **Natural Language Processing**
  - NLU = sub part of this discipline which aims at automated understanding general human language
  - Semantic Analysis :
    1. Find semantic roles : decompose the sentence into a "logical" structure
    2. Give a formal meaning to each element of this structure : lexical disambiguation and coreferences resolution

text → syntax → Semantic roles → formal meaning

Quelle est la taille de la tour Eiffel ?



Relation(s)

- taille(Which:?, PATIENT:tour Eiffel)

tour Eiffel → Eiffel tower (Q243)

taille → height (P2048)

→ open semantic model

Natural Language Generation, NLG

- **Description**

Question	:	Who is the president of France ?
Raw reply	:	Emmanuel Macron
Generated reply	:	Emmanuel Macron is the president of France.

- **Importance**
  - HMI : visual context makes question and answer often concomitant
  - Vocal : create a context that combines question and answer

- **Challenge**
  - The answer must take up the elements of the question and replace the focus of the question with the raw answer
  - The syntax of the generated response is different from that of the question

- **Our approach**
  - Transform the syntax of the question into a statement
  - Replace the focus of the question with the answer
  - Apply a language model to correct the response generated

Examples of replies generated

EXEMPLE 1

- Question : **Qui est le président de la République ?**
- Raw reply : **Emmanuel Macron**
- Expected reply : **Le président de la République est Emmanuel Macron.**
- Generated reply : **le président de la République est Emmanuel Macron**

→ **The "." and the capital letter of the first character are not generated**

EXEMPLE 2

- Question : **Qui sont les Beatles ?**
- Raw reply : **Groupe de musique**
- Expected reply : **Les Beatles est un groupe de musique.**
- Generated reply : **les Beatles est groupe de musique**

→ **Same problem and a « un » is missing**

Towards an actual digital BUTLER

Sylvain Marrec

The Butler : towards a sensitive, proactive and multimodal Home assistant

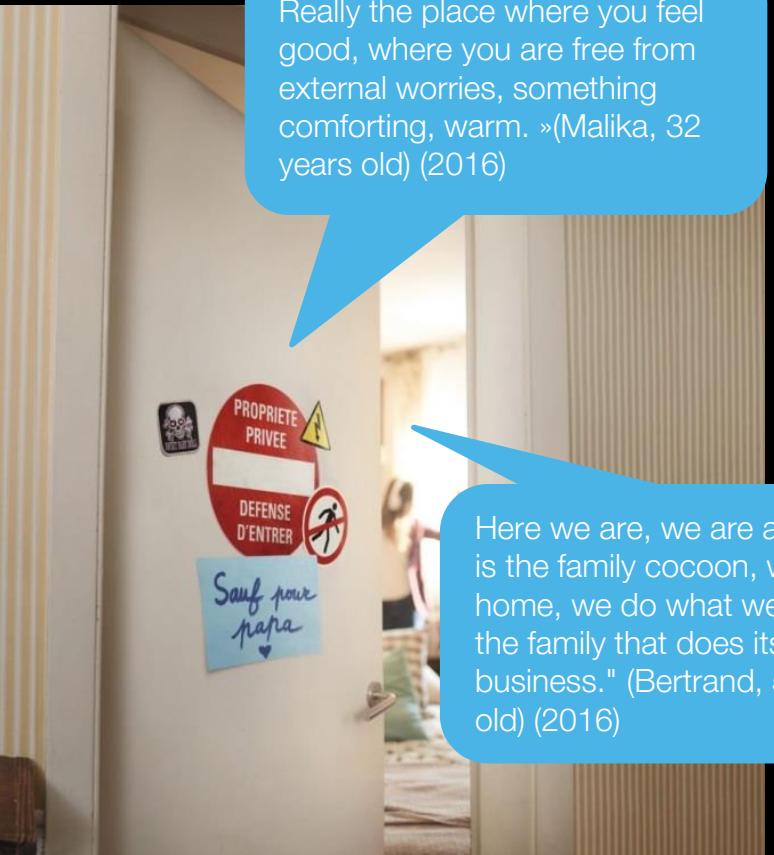
- Listen to all the "senses" of the house (voice command, IoT, IA, ...)
- Analyze and understand its environment
- Proposing and proactive
- Orchestrates and manages action priorities
- Multimodal
- Expressive
- Interacts with users and home equipment

Trust and privacy in Home'in
A major challenge

Sylvie Jumpertz

The house, sanctuary of privacy

and (very) personal data and content



Really the place where you feel good, where you are free from external worries, something comforting, warm. »(Malika, 32 years old) (2016)

Here we are, we are at home, it is the family cocoon, we are at home, we do what we want. It's the family that does its business." (Bertrand, 52 years old) (2016)

extrait étude Sociovision 2018

Confidence & Home'in: The issue

How to ensure :

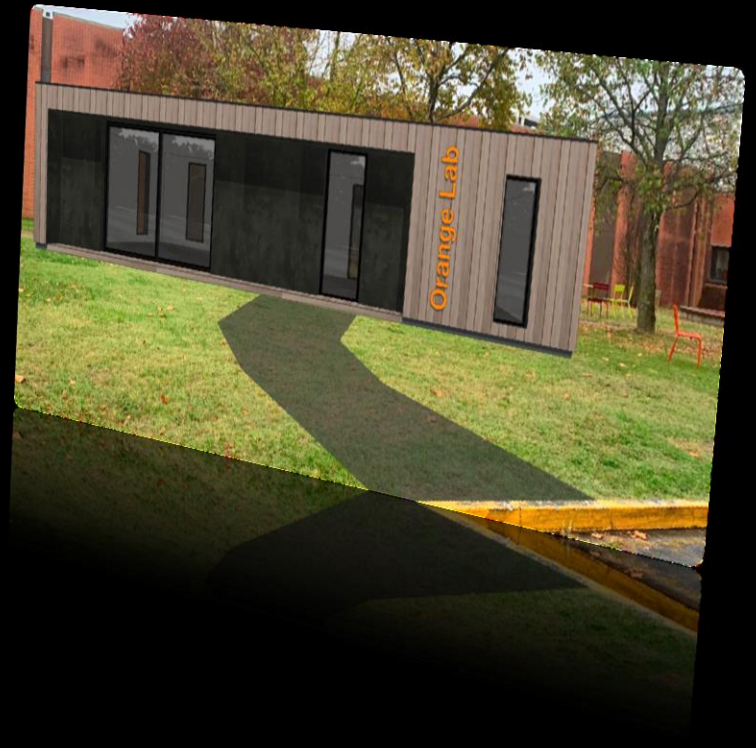
- That this feeling of security towards the domestic environment still exists in our Home’in home?
- That our new Home’in environment does not induce anxiety?
- That the user of our Home’in house be "confident" that their privacy will be preserved ?

Major objective
Build living labs

François-Xavier Lecarpentier

Live the Home'In experience

- Set up experience spaces
- In vivo testing and observation
- Onboard partners

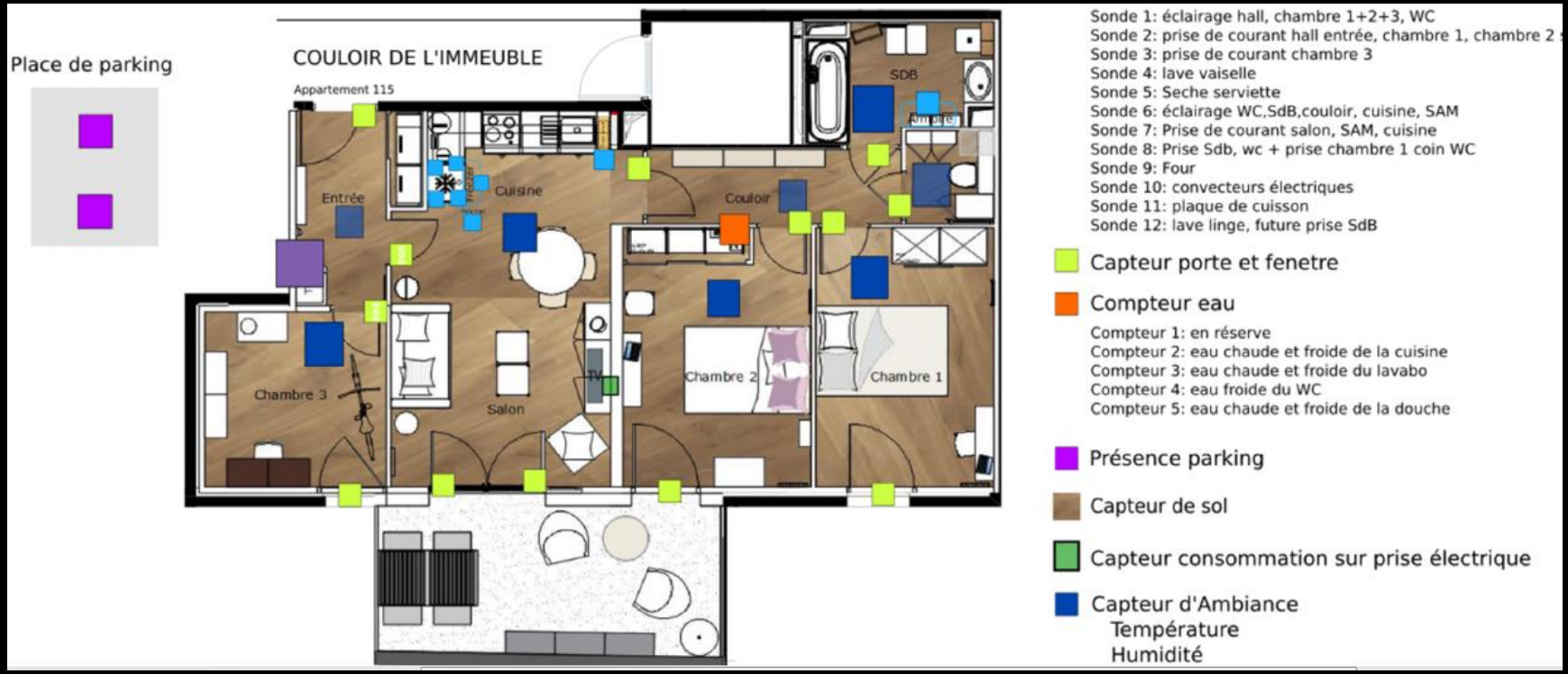


HuT, Montpellier, Human at home projecT

- Organisation, objectifs
  - Consortium 13 Laboratoires de recherche (SHS et Sciences exactes), 7 industriels (Nexity, Ikea, Enedis, …)
  - Quelles conditions du bien-être dans l'habitat connecté de demain ?
    - 20ème siècle : défi technologique, 21ème siècle : défi d'usage ?
  - Un logement connecté pour demain :
    - Ce qui est utile, souhaitable, acceptable (et ce qui ne l'est pas)
    - Comment garantir son caractère « authentiquement humain » ?
    - Comment la technologie peut-elle améliorer nos conditions d'habitation ?
    - Quelles conditions de vie dans le logement-type à venir : un appartement [illegible] équipé de nombreux capteurs, actionneurs et système d'analyse ?

- Un appartement connecté habité depuis septembre 2018
  - 2 étudiantes colocataires, loyer gratuit, obligation de participer à l'étude, avec engagement HUT respect vie privée
  - Orange Labs en collaboration juridique avec Université de Montpellier depuis septembre 2019

HuT, Montpellier, Human at home projecT



Smart Office, A new vertical

Challenge: re-use Home'In platform

- New connected devices
- New furnitures
- Another type of building structure
- Much more users
- Different social relations among people
- Specific activities
- Smart Office use cases and requirements

Thank you!

Contact: Fano Ramparany
fano.ramparany@orange.com